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Flexible piezoelectric ultrasonic energy harvester array using KNN-based lead free composite

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Potassium sodium niobate (K,Na)NbO_3/(KNN) lead-free ceramics have drawn vast amount of attention as one of the effective alternatives to lead-based ones. This talk reviews the main obtained results [1-3] in authors laboratory on how to enhance the piezoelectric properties of KNN-based ceramics, including the ions or compounds substitution, the constructing and types of phase boundaries near room temperature, the investigation of other tools (sintering aids, synthesis technique, poling conditions) on properties. A flexible piezoelectric ultrasonic energy harvester (PUEH) array was designed and fabricated by integrating a large number of piezoelectric active elements with multilayered flexible electrodes in an elastomer membrane. The developed flexible PUEH device can be driven by the ultrasonic wave to produce continuous voltage and current outputs on both planar and curved surfaces, reaching output signals of more than 2 Vpp and 4 μA, respectively. Potential applications of using the flexible PUEH to charge energy storage devices and power commercial electronics were demonstrated.

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